

Patient-Provider Discussions about Lung Cancer Screening Pre- and Post-Guidelines:

Health Information National Trends Survey (HINTS)

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Abstract

Objective: In 2013, the USPSTF issued a Grade B recommendation that long-term current and former smokers receive lung cancer screening. Shared decision-making is important for individuals considering screening, and patient-provider discussions an essential component of the process. We examined prevalence and predictors of lung cancer screening discussions pre- and post-USPSTF guidelines.

Methods: Data were obtained from two cycles of the Health Information National Trends Survey (2012; 2014). The analyzed sample comprised screening-eligible current and former smokers with no personal history of lung cancer (n=746 in 2012; n=795 in 2014). Descriptive and multiple logistic regression analyses were conducted; patient-reported discussion about lung cancer screening with provider was the outcome of interest.

Results: Contrary to expectations, patient-provider discussions about lung cancer screening were more prevalent pre-guideline, but overall patient-provider discussions were low in both years (17% in 2012; 10% in 2014). Current smokers were more likely to have had a discussion than former smokers. Significant predictors of patient-provider discussions included family history of cancer and having healthcare coverage.

Conclusions: The prevalence of patient-provider discussions about lung cancer screening is suboptimal.

Practice Implications: There is a critical need for patient and provider education about shared decision-making and its importance in cancer screening decisions.

1. Introduction

Lung cancer is the leading cause of cancer-related mortality for both genders in the United States accounting for an estimated 158,080 deaths in 2016 [1]. Most lung cancer patients are diagnosed with advanced disease, leading to low survival rates. Individuals with Stage IV lung cancer have a five-year relative survival rate of 1% [1]. Tobacco smoking is the number one risk factor for lung cancer and has been linked to 90% of all lung cancer cases [1]. Therefore, long-term smokers are at greatest risk for the development of lung cancer [2].

In response to empirical findings from the National Lung Screening Trial, the United States Preventive Services Task Force (USPSTF) issued guidelines recommending annual low-dose computed tomography (LDCT) for long-term smokers [3]. Specifically, current or former smokers aged 55 to 80 years who have quit within the past 15 years and have a 30-pack year or more tobacco smoking history are eligible for screening. Lung cancer screening with LDCT in long-term smokers has been shown to decrease relative lung cancer-related mortality by 20% via earlier identification and treatment [4]. The USPSTF's Grade B recommendation reflects the conclusion that available evidence was sufficient, with high certainty, that annual LDCT will yield moderate to substantial benefits for this high-risk group. Further, the Centers for Medicare and Medicaid Services (CMS) approved coverage of LDCT for its high-risk beneficiaries in February 2015 [5].

As part of the recommendation and approval by CMS, documentation of a shared decision-making visit is required for reimbursement of lung cancer screening. CMS defines the shared decision-making visit as an encounter between a healthcare provider (physician, nurse practitioner, clinical nurse specialist, or physician assistant) and a screening-eligible patient that discusses the benefits and harms of screening, potential for follow-up diagnostic testing, over-diagnosis, false positive rate, and total radiation exposure prior to the patient's decision to screen [5]. In addition, the USPSTF recommends shared decision-making be incorporated into

lung cancer screening programs as they are implemented [3]. Shared decision-making is a process in which the patient is an active partner with the healthcare provider to clarify acceptable medical options and decide on a preferred course regardless of the patient's cancer screening decision.

As lung cancer screening becomes more widely promoted and available nationally, patients will likely be seeking information about lung cancer screening from a variety of sources including their healthcare provider. Consequently, providers are expected to be fielding more questions from patients about lung cancer screening. As the first cancer screening modality to specifically require documentation of a shared decision-making visit for reimbursement, the patient-provider discussion is essential. It is critical to understand the trends of this encounter in lung cancer screening and the factors that influence and inform such discussions. However, no prior studies have examined the extent to which current and former smokers engage in discussions about lung cancer screening with their healthcare providers. Healthcare provider recommendations are strong predictors of screening for other cancers [6-8] and are likely to be influential in the decision to participate, or not, in lung cancer screening. With the issuance of a Grade B recommendation from the USPSTF, it becomes valuable to document both baseline and trends in patient-provider discussions. Because patient-provider discussions are an important component of the shared decision-making process, understanding the prevalence of these discussions pre- and post-issuance of lung cancer screening guidelines has the potential to identify communication inequities. Further, the findings may guide future research focused on areas for promoting discussions between providers and their patients who are current and former smokers.

1.1 Purpose

In this paper, we examine the prevalence of discussions about lung cancer screening in 2012 (prior to the USPSTF lung cancer screening recommendation) compared with 2014 (post-

recommendation) among current and former smokers aged 55 to 80 years using a U.S. nationally representative sample. We further identify the predictors of having a discussion with a healthcare provider about lung cancer screening pre- and post-guideline issuance among current and former smokers.

2. Methods

2.1 Data Source

We obtained data from two recent rounds of the Health Information National Trends Survey (HINTS 4 Cycle 2 conducted between October 2012 and January 2013, and Cycle 4 conducted between August and November 2014). These two survey cycles included a relevant question on patient-provider discussions about lung cancer screening for this study.

2.2 Sample and Data Collection

HINTS is a nationally representative cross-sectional survey, administered by the National Cancer Institute that collects data about the use of cancer-related information by U.S. adults aged 18 years and older. The study design and sampling framework have been described elsewhere [9]. Briefly, HINTS has a two-stage sampling design. The first stage uses a stratified sample of addresses selected from a file of U.S. residential addresses for inclusion. The second stage involves the selection of one adult within each sampled household using the Next Birthday Method. HINTS 4 Cycles 2 and 4 used a mailed paper and pencil questionnaire (available in both English and Spanish) for data collection. The overall response rate (RR2 formula of the American Association for Public Opinion Research) for HINTS 4 Cycle 2 was 40%, resulting in $N = 3,630$ completed questionnaires. The overall response rate for HINTS 4 Cycle 4 was 34%, resulting in $N = 3,677$ completed questionnaires. In this study, we restricted the analyses to 746 respondents in Cycle 2 and 795 respondents in Cycle 4 who were either current or former smokers, aged 55 to 80 years, and who had no personal history of lung cancer (Figure 1). These criteria were adapted from screening eligibility criteria for lung cancer screening from the USPSTF guidelines and have been utilized in recent studies [10,11]. The

HINTS survey did not assess cigarette pack-year history and thus it was not among the inclusion criteria in our study.

2.3 Measures

The primary outcome variable is the dichotomous response to the question, “At any time in the past year, have you talked with your doctor or other health professional about having a test to check for lung cancer?” with response options of yes, no, and don’t know. The predictor variables included survey year (2012 and 2014), age (in years), sex, race/ethnicity (white, black, Hispanic, or other), education (less than high school to college graduate or higher), household annual income (less than \$20,000 to \$75,000 or higher), self-reported general health status (excellent to poor), smoking status (current or former smoker), personal history of cancer (excluding lung), family history of cancer, and healthcare coverage (e.g., health insurance, prepaid plans or HMO, or government plans such as Medicare). Missing, multiple responses, “inapplicable”, and “don’t know” answers were recoded as missing for analytic purposes.

2.4 Data Analyses

Analyses were conducted using Stata version 13 using descriptive statistics and multiple logistic regression. We calculated the weighted prevalence of self-reported discussions with a doctor or healthcare professional about lung cancer screening and distributions of demographic and other variables in 2012 and 2014. We merged the two cycles of HINTS 4 data for the logistic regression following procedures described in the HINTS documentation for examining changes across years [12]. Analyses were performed using the jackknifed replication weights provided in the datasets. These weights account for sampling design, oversampling, and non-response patterns in the data. Missing values on the outcome variable (n=62 in 2012; n=34 in 2014) were omitted from the logistic regression model. Missing values in one or more predictor variables accounted for 16% of the analyzed sample. To reduce potential bias due to excluding these participants, missing values of each predictor variable were treated as a separate

category in the logistic regression model as described in previous research using the HINTS survey data [13].

3. Results

3.1 Prevalence of Patient-Provider Discussions and Sociodemographic Comparisons between Respondents in 2012 and 2014

Table 1 summarizes the prevalence of patient-provider discussions about lung cancer screening in the past year and the characteristics of the analyzed samples in 2012 (Cycle 2) and 2014 (Cycle 4). Overall, a modest proportion of respondents had a discussion with their healthcare provider about lung cancer screening before (17% in 2012) and after (10% in 2014) the screening guidelines were issued. Mean age of the analyzed sample in both cycles was approximately 65 years. In addition, in both cycles, about half were female, predominantly white, had some college education or higher, reported household incomes below \$75,000, self-reported good to excellent health, had healthcare coverage, and were former smokers. Most did not have a personal history of cancer, although the majority reported having a family member who had a cancer diagnosis. There were no significant sociodemographic trend differences in 2014 compared to those in 2012 in age, gender, race/ethnicity, education, income level, smoking status, personal history of cancer, or family history of cancer. When examining prevalence of discussions occurring by racial/ethnic group, similar prevalence was noted across all groups in both years.

3.2 Predictors of Patient-Provider Discussions Pre- and Post-Lung Cancer Screening Guidelines

Multiple logistic regression analysis was performed to identify predictors of patient-provider discussions about lung cancer screening (see Table 2). Respondents from the Cycle 4 (2014) survey had about 53% lower odds of having a discussion about lung cancer screening with their healthcare provider than respondents from the Cycle 2 (2012) survey (odds ratio [OR], 0.47; 95% confidence interval [CI], 0.31-0.72). In addition, current smokers had higher odds of

having such discussions than former smokers (OR, 2.25; CI, 1.34-3.79), and those who had a family history of cancer (OR, 2.53; CI, 1.43-4.48) and who had healthcare coverage (OR, 2.90; CI, 1.10-7.69) also had higher odds of reporting having a discussion with their healthcare provider about screening.

4. Discussion and Conclusion

4.1 Discussion

As clinical encounters evolve to incorporate shared decision-making in lung cancer screening decisions, increased focus on the patient-provider discussion is important. Shared decision-making is a moral obligation clinically, and the reimbursement requirement in lung cancer screening offers an incentive for shared decision-making to occur in the busy clinical encounter. The current landscape offers the opportunity to examine a key component of the shared decision-making process, the patient-provider discussion, and can be used to compare trends as the science advances in shared decision-making in cancer screening overall.

This study reveals patient-provider discussions occurred in less than 20% of screening-eligible current and former smokers. Patient-provider discussions and subsequent healthcare provider recommendations are associated with increased cancer screening behavior in other types of cancer such as breast and colorectal with patient-provider discussions occurring in approximately 50 to 80% of screening eligible patients [15-17]. However, unlike many cancers, there is a higher level of stigma associated with lung cancer [18,19], which may be contributing to the overall low prevalence of patient-provider discussions in lung cancer screening. Smokers are a unique population different from those targeted for other types of cancer screening. Smokers experience stigma, battle an addiction to nicotine, and perceive blame from others related to the perceived self-infliction of tobacco-related diseases secondary to lifestyle choices [18,19]. Therefore, perceived stigma seems relevant in lung cancer screening.

Patient-provider discussions of 17% and 10% respectively in 2012 and 2014 support a critical need for efforts targeting both patient and provider education. From the patient

perspective, educational efforts that support increasing awareness of lung cancer risk as well as the availability of lung cancer screening are essential. Equally, provider education about the importance of the shared decision-making process in lung cancer screening is crucial in order to enhance patient-provider discussions in this area. Further, given the unique relevance of stigma in lung cancer and its potential influence in screening, it is equally important that future educational efforts address the perception of stigma from the patient perspective as well as implicit and explicit stigma from the provider perspective in order to create an environment more conducive to effective discussions about screening and prevention.

We expected the prevalence of patient-provider discussions to increase after lung cancer screening guidelines were issued, particularly given the specific language related to shared decision-making in the USPSTF recommendation. However, the findings suggest the reverse occurred—there were fewer discussions in 2014 compared to 2012. It is plausible that the findings are affected by increased discussions in 2012 following heightened media coverage of the landmark findings of decreased mortality rates with annual LDCT in the National Lung Screening Trial in 2011 [20,21]. These findings were released in late 2010 resulting in increased media coverage via print and electronic communication about the benefits of lung cancer screening, which may have contributed to more patients raising the topic with their healthcare providers.

Current smokers were more likely than former smokers to have this discussion. Patient-provider discussions about lung cancer screening with current smokers offers a timely opportunity for both shared decision-making about cancer screening as well as the opportunity of a potentially teachable moment for smoking cessation. These encounters offer an environment encapsulated by the clinical encounter to first assess the stage of readiness of the current smoker and subsequent intervention to promote smoking cessation. This intervention can extend to future clinical encounters such as follow-up for screening results offering additional opportunities to intervene and promote smoking cessation. In addition, our study

found that insured patients were more likely to have these discussions with their healthcare provider compared with uninsured patients. This underscores the need for lung cancer screening programs for the uninsured and underserved similar to the National Breast and Cervical Cancer Early Detection Screening Program.

While it is important for these discussions to occur between current smokers and their healthcare providers, it is equally critical for screening-eligible former smokers. Approximately 60% of lung cancers are diagnosed in former smokers [1], making the shared decision-making process in this population critical in efforts of early detection and diagnosis of lung cancer for a population that may perceive they have a lower risk for lung cancer after having successfully quit smoking. More effort will be needed to raise the salience of lung cancer screening among former smokers through provider discussions.

In addition, the examination of prevalence trends pre- and post-lung cancer screening guidelines and sociodemographic characteristics from both years offers insight into the current state of patient-provider discussions about lung cancer screening. For example, the lack of racial/ethnic differences in conversations as well as prevalence that is similar to the U.S. population of blacks versus whites is encouraging as this may indicate a lack of disparity (i.e., equal numbers of discussions are occurring with black smokers compared to white smokers about lung cancer screening). However, this finding may be influenced by a floor effect due to the overall low prevalence of patient-provider discussions in both years across all racial/ethnic groups. Continued monitoring of the prevalence of patient-provider discussions about lung cancer screening among minorities will be important in the coming years to ensure there is no disparity in these discussions.

A few limitations should be acknowledged. The questions in HINTS did not differentiate whether the discussion about lung cancer screening was initiated by the patient or the provider. Future research should differentiate who is initiating the discussion in order to better target the group (i.e., patient and/or provider) that needs the most education. Further, while the single-item

measure of patient-provider discussion is adequate to examine the prevalence of these discussions, it does not encompass the complex dimensions of shared decision-making and should be viewed as a proxy. Additional research is needed to measure shared decision-making in the context of the lung cancer screening discussion to fully understand the process. In addition, because the HINTS did not report pack-year history for tobacco smoking, we were unable to perform analyses among participants who were eligible for lung cancer screening based on the pack-year criterion included in the USPSTF guidelines. Our analyses included individuals who self-identified as current or former smokers and our results may underestimate the true percentage of eligible smokers who have discussions with their healthcare providers about lung cancer screening. However, given that the vast majority of smokers initiate smoking prior to age 26 [14], and that we limited our sample to current smokers between the ages of 55 and 80 years, it is plausible that the analyzed sample included long-term smokers rather than smokers who had initiated smoking recently.

4.2 Conclusion

Lung cancer screening offers the opportunity to promote a patient-centered approach to cancer screening by involving patients through shared decision-making. The shared decision-making process offers the healthcare provider the opportunity to address both the benefits and potential risks of lung cancer screening and work with their patients toward a mutually agreeable shared decision that acknowledges the individual's preferences. To our knowledge, this is the first study to examine the prevalence of this critical component of the shared decision-making process in lung cancer screening and document a benchmark of prevalence in shared decision-making in lung cancer screening using the patient-provider discussion as a proxy. Future research focused on shared decision-making in lung cancer screening must include an examination of all aspects of health communication, including potential perceived stigma in the clinical encounter, in order to enhance the shared decision-making process between healthcare providers and their high-risk patients.

4.3 Practice Implications

Patient-provider discussions about lung cancer screening are low compared to discussions about other types of cancer screening. Increased awareness of the current inequity in these types of discussion can foster increased attention in the clinical encounter for high-risk current and former smokers. **This research highlights a critical need for healthcare providers to be educated, both formally and through training opportunities, on skills to encourage shared decision-making about lung cancer screening with eligible smokers. In addition, patient education about the shared decision-making process is also critical to fully engage patients in making informed decisions regarding their healthcare. Both provider and patient education about shared decision-making will not only improve patient-provider discussions about lung cancer screening, but may also benefit discussions about other cancer screening procedures.**

References

1. American Cancer Society. Cancer Facts & Figures 2016. Atlanta, GA.
2. Wender R, Fontham ET, Barrera E Jr, et al. American Cancer Society lung cancer screening guidelines. *CA Cancer J Clin.* 2013;63:107-17. PMID:23315954.
3. Moyer VA; U.S. Preventive Services Task Force. Screening for lung cancer: U. S. Preventive Services Task Force recommendation. *Ann Intern Med.* 2014;160:330-8. PMID:24378917.
4. Aberle, DR, Adams AM, Berg, CD, et al. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med.* 2011;365:395-409. PMID:21714641.
5. Centers for Medicare & Medicaid Services. Decision memo for screening for lung cancer with low-dose computed tomography (LDCT). Available at <https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=274>. Accessibility verified January 8, 2016.
6. Dominick KL, Skinner CS, Bastian LA, Bosworth HB, Strigo TS, Rimer BK. Provider characteristics and mammography recommendation among women in their 40s and 50s. *J Womens Health.* 2003;12:61-71. PMID: 12639370.
7. Sabatino SA, Burns RB, Davis RB, Phillips RS, McCarthy EP. Breast cancer risk and provider recommendation for mammography among recently unscreened women in the United States. *J Gen Intern Med.* 2006;21:285-291. PMCID: PMC1484729.
8. Ye J, Xu Z, Aladesanmi O. Provider recommendation for colorectal cancer screening: Examining the role of patients' socioeconomic status and health insurance. *Cancer Epidemiol.* 2009;33:207-211. PMID: 197167808.
9. Westat. *Health Information National Trends Survey 4 (HINTS 4) Cycle 4 Methodology Report*. Rockville, MD: Westat; 2015.
http://hints.cancer.gov/docs/Instruments/HINTS_4_Cycle_4_Methodology_Report_Final.

- pdf. Accessibility verified January 13, 2016.
10. Jonnalagadda S, Bergamo C, Lin JJ, et al. Beliefs and attitudes about lung cancer screening among smokers. *Lung Cancer*. 2012;77:526-31.
 11. Tanner NT, Egede LE, Shamblin C, et al. Attitudes and beliefs toward lung cancer screening among US Veterans. *Chest*. 2013;144:1783-7.
 12. Rizzo L, Moser RP, Waldron W, et al. *Analytic Methods to Examine Changes Across Years Using HINTS 2003 & 2005*. Washington, D.C.: National Cancer Institute; 2008: 1-36. http://hints.cancer.gov/docs/HINTS_Data_Users_Handbook-2008.pdf. Accessed January 6, 2016.
 13. Chou WS, Liu B, Post S, et al. Health-related Internet use among cancer survivors: Data from the Health Information National Trends Survey, 2003–2008. *J Cancer Surviv*. 2011;5(3):263-270. doi:10.1007/s11764-011-0179-5.
 14. Centers for Disease Control and Prevention. Smoking and tobacco use. Atlanta: U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, Office of Smoking and Health, 2014. Available at http://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/. Accessibility verified January 22, 2016.
 15. Lafata JE, Divine G, Moon C, et al. Patient–physician colorectal cancer screening discussions and screening use. *Amer J Prev Med*. 2006;31:202-9. doi:10.1016/j.amepre.2006.04.010.
 16. Taylor V, Lessler D, Mertens K, et al. Colorectal cancer screening among African Americans: The importance of physician recommendation. *J Natl Med Assoc*. 2003;95:806-812.
 17. O'Malley MS, Earp JA, Hawley ST, et al. The association of race/ethnicity, socioeconomic status, and physician recommendation for mammography: Who gets the message about breast cancer screening? *Am J Public Health*. 2001;91:49-54.

18. Chapple A, Ziebland S, McPherson A. Stigma, shame, and blame experienced by patients with lung cancer: qualitative study. *Brit Med J*. 2004;328:1470. doi:10.1136/bmj.38111.639734.7C.
19. Carter-Harris L, Ceppa DP, Hanna N, et al. Lung cancer screening: What do long-term smokers know and believe? *Health Exp*. 2015 [Epub ahead of print]. doi:10.1111/hex.12433
20. National Institutes of Health. Lung cancer trial results show mortality benefit with low-dose CT. Available at <http://www.nih.gov/news-events/news-releases/lung-cancer-trial-results-show-mortality-benefit-low-dose-ct>. Accessibility verified January 25, 2016.
21. The Washington Post. Using CT scans for lung cancer triggers debate. Available at: https://www.washingtonpost.com/national/health-science/ct-scans-for-lung-cancer-triggers-debate/2011/08/10/gIQAStbhHJ_story.html. Accessibility verified January 25, 2016.

Table 1 – Prevalence of discussion with healthcare providers about lung cancer screening and sample characteristics in 2012 and 2014 (weighted)

	HINTS 4 Cycle 2, 2012 (n=746)	HINTS 4 Cycle 4, 2014 (n=795)
	Weighted (% or M(SE))	Weighted (% or M(SE))
Talked to doctors or health professional		
No	75.1	85.5
Yes	16.7	10.4
Missing	8.1	4.1
Age	65.1(0.3)	65.2(0.2)
Gender		
Male	50.4	50.6
Female	47.9	48.5
Missing	1.7	0.9
Race/ethnicity		
White	73.7	68.8
Black	7.4	8.6
Hispanic	4.6	7.4
Other	2.0	3.1
Missing	12.2	12.2
Education		
Less than high school	17.6	17.7
12 years or completed high school	22.6	21.5
Post high school or some college	37.2	33.3
College graduate or higher	22.1	26.0
Missing	0.6	1.4
Income		
Less than \$20,000	23.8	21.6
\$20,000-35,000	15.8	15.9
\$35,000-50,000	14.2	16.2
\$50,000-75,000	16.9	16.8
\$75,000 or more	27.0	29.0
Missing	2.2	0.5
General health		
Excellent	7.0	5.2
Very good	31.7	32.1
Good	36.1	40.2
Fair	18.2	16.7
Poor	3.9	3.3
Missing	3.1	2.6
Smoking status		
Current smoker	29.0	27.7
Former smoker	71.0	72.3
Personal history of cancer (except lung)		
No	82.0	83.0
Yes	18.0	17.0

Table 1. continued

	HINTS 4 Cycle 2, 2012 (n=746)	HINTS 4 Cycle 4, 2014 (n=795)
	Weighted	Weighted
	(% or M(SE))	(% or M(SE))
	HINTS 4 Cycle 2, 2012 (n=746)	HINTS 4 Cycle 4, 2014 (n=795)
Family history of cancer		
No	31.5	25.5
Yes	67.4	73.1
Missing	1.1	1.4
Health Insurance		
No	11.7	7.5
Yes	86.9	90.4
Missing	1.4	2.1

Table 2 – Logistic regression predicting talking to doctors or health professionals about lung cancer screening in 2012 and 2014

	Adjusted OR	95% CI
Survey year		
2012 (referent)	1	
2014	0.47***	[0.31,0.72]
Age (years)	1.02	[0.99,1.06]
Gender		
Male (referent)	1	
Female	0.80	[0.51,1.26]
Race/ethnicity		
White (referent)	1	
Black	1.23	[0.71,2.13]
Hispanic	1.70	[0.74,3.91]
Other	1.32	[0.33,5.22]
Education		
Less than high school (referent)	1	
12 years or completed high school	0.50	[0.22,1.11]
Post high school or some college	0.84	[0.40,1.76]
College graduate or higher	0.59	[0.25,1.39]
Income		
Less than \$20,000 (referent)	1	
\$20,000-35,000	1.23	[0.56,2.69]
\$35,000-50,000	1.23	[0.56,2.71]
\$50,000-75,000	0.99	[0.45,2.21]
\$75,000 or more	1.19	[0.49,2.87]
General health		
Excellent (referent)	1	
Very good	1.56	[0.47,5.15]
Good	1.85	[0.59,5.82]
Fair	1.51	[0.46,5.03]
Poor	3.73	[0.79,17.64]
Smoking status		
Former smoker (referent)	1	
Current smoker	2.25**	[1.34,3.79]
Personal history of cancer (except lung)		
No (referent)	1	
Yes	1.63	[0.92,2.87]
Family history of cancer		
No (referent)	1	
Yes	2.53**	[1.43,4.48]
Health Insurance		
No (referent)	1	
Yes	2.90*	[1.10,7.69]

Note. *p<0.05; **p<0.01. Missing cases of talking to doctors (n=62 in 2012; n=34 in 2014). Missing values of predictor variables were treated as a separate category in the logistic regression models. Analyses were weighted to the U.S. general adult population using full sample and replicate weights provided in the HINTS data set.